



VERIFICATION OF A TRANSLATION

I, the below named translator, hereby declare that:

My name and post office address are as stated below;

That I am knowledgeable in the English language and in Japanese language and believed the attached English translation to be true and complete translation of the below identified document.

The document for which the attached English translation is being submitted is the Japanese Patent Application No. 2000-357772, filed in Japan on November 24, 2000.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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[DOCUMENT TITLE] SPECIFICATION

[TITLE OF THE INVENTION] INFORMATION RECORDING APPARATUS

[CLAIMS]

[CLAIM 1] An information recording apparatus that comprises
5 information attaching and generating means, which attaches a track
number information to each track recorded in an information recording
medium and generates group control information to control one or a
plurality of tracks as one group, characterized in that said information
recording apparatus comprises:

10 a recording method change detecting means for giving a
grouping instruction to said information attaching and generating means
when the instruction to change a track recording method to said
information recording medium is detected,

wherein said information attaching and generating means
15 generates the group control information by making the tracks from the
track where recording to said information recording medium is started to
at least the track already recorded at the point when said grouping
instruction is received be the same group.

[CLAIM 2] The information recording apparatus according to claim 1,
20 characterized in that said information attaching and generating means
generates the group control information by making the track recorded
after said grouping instruction is received be a group different from said
track already recorded.

[Claim 3] An information recording apparatus that comprises
25 information attaching and generating means, which attaches a track
number information to each track recorded in an information recording

medium and generates group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus comprises:

an operation mode change detecting means for giving a grouping
5 instruction to said information attaching and generating means when a change of an operation state of a device in a recording source is detected,

wherein said information attaching and generating means generates the group control information by making the tracks from the track where recording to said information recording medium is started to
10 at least the track already recorded at the point when said grouping instruction is received be the same group.

[Claim 4] The information recording device according to Claim 3, wherein said information attaching and generating means generates the group control information by making the track recorded after said
15 grouping instruction is received be a group different from said track already recorded.

[Claim 5] An information recording apparatus that comprises information attaching and generating means, which attaches a track number information to each track recorded in an information recording
20 medium and generates group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus comprises:

an operation mode change detecting means for giving a grouping instruction to said information attaching and generating means when a
25 change of a recording mode in said information recording apparatus is detected,

wherein said information attaching and generating means generates the group control information by making the tracks from the track where recording to said information recording medium is started to at least the track already recorded at the point when said grouping instruction is received be the same group.

[Claim 6] The information recording apparatus according to Claim 5, characterized in that said information attaching and generating means generates the group control information by making the track recorded after said grouping instruction is received be a group different from said track already recorded.

[Claim 7] The information recording apparatus according to any one of Claims 1 to 5, characterized in that wherein said information attaching and generating means attaches said track number information to the tracks sequentially recorded from the track where said recording is started in such a manner that the number continuously increases.

[Claim 8] An information recording apparatus that comprises information attaching and generating means, which attaches a track number information to each track recorded in an information recording medium and generates group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus comprises:

a recording source change detecting means for giving a grouping instruction to said information attaching and generating means when a change of a recording source is detected,

wherein said information attaching and generating means generates the group control information by making the tracks from the

track where recording to said information recording medium is started to at least the track already recorded at the point when said grouping instruction is received be the same group.

[Claim 9] The information recording apparatus according to Claim 8,
5 wherein said information attaching and generating means generates the group control information by making the track recorded after said grouping instruction is received be a group different from said track already recorded.

[Claim 10] The information recording apparatus according to Claim 8
10 or 9, wherein said information attaching and generating means attaches said track number information to the tracks sequentially recorded from the track where said recording is started in such a manner that the number continuously increases.

[Claim 11] The information recording apparatus according to Claim 10,
15 wherein said information attaching and generating means attaches the track number information in such a manner that said track number information attached to the tracks from the track where said recording is started to the track already recorded at the point when said grouping instruction is received and said track number information attached to the
20 track recorded after said grouping instruction is received are discriminated.

[DETAILED DESCRIPTION OF THE INVENTIO]

[0001]

[FIELD OF THE INVENTION]

25 The present invention relates to an information recording apparatus having a means for attaching track number information to

every track recorded in an information recording medium.

[0002]

[PRIOR ART]

As an information recording medium in which music
5 information and image information are recorded, a tape shaped
information recording medium represented by a cassette tape, a DAT
(digital audio tape), 8 mm tape and the like, and a disc information
recording medium represented by an LD (laser disc), a CD (compact disc),
an MD (mini disc), a DVD (digital versatile disc) and the like are known.

10 [0003]

In recent years, writing and rewriting of information have been
made possible in the disc information recording medium, and it has been
remarkably spread combined with an advantage of quick access to the
recorded information.

15 [0004]

When music (hereinafter, simply described as "tune") is recorded
in the disc information recording medium, one tune is made to be a unit
called a "track", for example, and it can be controlled by attaching track
number information. Such track number information is included in
20 control information called a TOC (Table of content) recorded in the
innermost peripheral part of the disc together with information to control
recording data such as a disc name, a tune name, a tune number, a total
playing time, a starting position and an ending position of the tune on the
disc (a starting time and an ending time in the case of controlling the
25 position by time information) and the like. When a user replays a
recorded tune, he/she operates a recording, replaying and editing device

for the disc to designate such track number information, and can select the recorded tune.

[0005]

Incidentally, the number of tunes that can be recorded in one disc information recording medium has been remarkably increased due to improvement of information recording density in the disc information recording medium and a new information compression method. For example, the MD has conventionally adopted the information compression method called an ATRAC (Adaptive Transform Acoustic Coding). Recently, an MDLP standard has been established in which the information recording is performed by the information compression method called an ATRAC3 having compression efficiency double or four times that of the conventional ATRAC. According to the ATRAC3, the maximum 320 minute recording is possible with a four times extended recording mode by the MD having 80 minute standard recording time. With such a new information compression method, about 60 tunes can be recorded in one disc even if the playing time of one tune is about five minutes.

[0006]

[PROBLEM TO BE SOLVED BY THE INVENTION]

However, as the recording medium can record such a great number of tunes, it takes much time to select a tune for replay to complicate the control of the tunes. Accordingly, a method has been proposed that the user gathers one or a plurality of tunes to make them a group and control the tunes by every group (hereinafter, referred to as "group control"). In such a group control, since information such as a same group name is attached to the tunes that belong to the same group

(same genre, for example), the user can firstly designate the group name and then designate the track number information that belongs to the group, and thus the user can efficiently select the tune to be replayed.

[0007]

5 However, to perform the group control, the user must decide a group for each tune, or a group for a range of tunes and input a group name or the like to each group. Particularly, when recording many tunes from various kinds of media, grouping the tunes can become complicated, and the user may suffer an operation load.

10 [0008]

The present invention has been created from the consideration of the foregoing points. The object of the present invention is to provide an information recording apparatus that can efficiently group the track and can reduce the operation load of the user.

15 [0009]

[MEANS FOR SOLVING THE PROBLEM]

To solve the above problem, the invention described in claim 1 is provided with an information recording apparatus that comprises information attaching and generating means, which attaches a track
20 number information to each track recorded in an information recording medium and generates group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus comprises: a recording method change detecting means for giving a grouping instruction to said information attaching and
25 generating means when the instruction to change a track recording method to said information recording medium is detected, wherein said

information attaching and generating means generates the group control information by making the tracks from the track where recording to said information recording medium is started to at least the track already recorded at the point when said grouping instruction is received be the same group.

[0010]

According to the invention described in claim 1, when recording method change detecting means detects an instruction to change the method of the track recording to the information recording medium after the track recording has started, the grouping instruction is given to the information attaching and generation means. Then, the information attaching and generation means generates the group control information by making the tracks from the one where the recording to the information recording medium is started to the one already recorded at the point when the grouping instruction is received be the same group, for example, the information of the same group name is attached. Therefore, since the grouping is automatically performed by the recording method change, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

[0011]

The invention described in claim 2 is provided with the information recording apparatus according to claim 1, characterized in that said information attaching and generating means generates the group control information by making the track recorded after said grouping instruction is received be a group different from said track already recorded.

[0012]

According to the invention described in claim 2, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

5 [0013]

The invention described in claim 3 is provided with an information recording apparatus that comprises information attaching and generating means, which attaches a track number information to each track recorded in an information recording medium and generates
10 group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus comprises: an operation mode change detecting means for giving a grouping instruction to said information attaching and generating means when a change of an operation state of a device in a recording source is
15 detected, wherein said information attaching and generating means generates the group control information by making the tracks from the track where recording to said information recording medium is started to at least the track already recorded at the point when said grouping instruction is received be the same group.

20 [0014]

According to the invention described in claim 3, when operation state change detecting means detects an operation state change of a device in a recording source after the track recording has started, the grouping instruction is given to the information attaching and generation
25 device. Then, the information attaching and generation means generates the group control information by making the tracks from the one where

the recording to the information recording medium is started to the one already recorded at the point when the grouping instruction is received by the same group, for example, the information of the same group name is attached. Therefore, since the grouping is automatically performed by the operation state change of the device in the recording source, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced. Herein, the recording source device a source to supply the information to the information recording device, and an AM broadcasting, an FM broadcasting and the like, for example, are included other than the recording medium such as the CD, the MD and the DVD. In addition, the device in the recording source mainly device a device to supply the information of the recording source, for example, a CD player that supplies the information to the information recording apparatus.

[0015]

The invention described in claim 4 is provided with the information recording device according to claim 3, wherein said information attaching and generating means generates the group control information by making the track recorded after said grouping instruction is received by a group different from said track already recorded.

[0016]

According to the invention described in claim 4, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

[0017]

The invention described in claim 4 is provided with an

information recording apparatus that comprises information attaching and generating means, which attaches a track number information to each track recorded in an information recording medium and generates group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus comprises: an operation mode change detecting means for giving a grouping instruction to said information attaching and generating means when a change of a recording mode in said information recording apparatus is detected, wherein said information attaching and generating means generates the group control information by making the tracks from the track where recording to said information recording medium is started to at least the track already recorded at the point when said grouping instruction is received be the same group.

[0018]

According to the invention described in claim 5, when recording mode change detecting means detects a recording mode change in the information recording apparatus after the track recording has started, the grouping instruction is given to the information attaching and generation means. Then, the information attaching and generation means generates the group control information by making the tracks from the one where the recording to the information recording medium is started to the one already recorded at the point when the grouping instruction is received be the same group, for example, the information of the same group name is attached. Therefore, since the grouping is automatically performed by the recording mode change of the device in the recording source, the user can omit the operation that he/she performs the grouping by himself/herself,

and thus the operation load of the user can be reduced.

[0019]

The invention described in claim 6 is provided with the information recording apparatus according to claim 5, characterized in that said information attaching and generating means generates the group control information by making the track recorded after said grouping instruction is received be a group different from said track already recorded.

[0020]

According to the invention described in claim 6, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

[0021]

The invention described in claim 7 is provided with the information recording apparatus according to any one of Claims 1 to 5, characterized in that wherein said information attaching and generating means attaches said track number information to the tracks sequentially recorded from the track where said recording is started in such a manner that the number continuously increases.

[0022]

According to the invention described in claim 7, the group control can be efficiently performed with the group control information because continuous track number information is attached to the track.

[0023]

The invention described in claim 8 is provided with an information recording apparatus that comprises information attaching

and generating means, which attaches a track number information to each track recorded in an information recording medium and generates group control information to control one or a plurality of tracks as one group, characterized in that said information recording apparatus
5 comprises: a recording source change detecting means for giving a grouping instruction to said information attaching and generating means when a change of a recording source is detected, wherein said information attaching and generating means generates the group control information by making the tracks from the track where recording to said information
10 recording medium is started to at least the track already recorded at the point when said grouping instruction is received be the same group.

[0024]

According to the invention described in claim 8, when recording source change detecting means detects a recording source change after
15 the track recording has started, the grouping instruction is given to the information attaching and generation means. Then, the information attaching and generation means generates the group control information by making the tracks from the one where the recording to the information recording medium is started to the one already recorded at the point when
20 the grouping instruction is received be the same group, for example, the information of the same group name is attached. Therefore, since the grouping is automatically performed by the recording source change, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

25 [0025]

The invention described in claim 9 is provided with the

information recording apparatus according to claim 8, wherein said information attaching and generating means generates the group control information by making the track recorded after said grouping instruction is received be a group different from said track already recorded.

5 [0026]

According to the invention described in claim 9, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

[0027]

10 The invention described in claim 10 is provided with the information recording apparatus according to claim 8 or 9, wherein said information attaching and generating means attaches said track number information to the tracks sequentially recorded from the track where said recording is started in such a manner that the number continuously
15 increases.

[0028]

According to the invention described in claim 10, the group control can be efficiently performed with the group control information because continuous track number information is attached to the track.

20 [0029]

The invention described in claim 11 is provided with the information recording apparatus according to Claim 10, wherein said information attaching and generating means attaches the track number information in such a manner that said track number information
25 attached to the tracks from the track where said recording is started to the track already recorded at the point when said grouping instruction is

received and said track number information attached to the track recorded after said grouping instruction is received are discriminated.

[0030]

According to the invention described in claim 11, since the track
5 number information attached to the track is discriminated before and after receiving the grouping instruction, the user can easily grasp individual group from the track number information as well.

[0031]

[PREFERRED EMBODIMENTS OF THE INVENTION]

10 The preferred embodiments of the present invention will be described with reference to the accompanying drawings. The following description is the embodiments when the information recording apparatus of the present invention is applied to the magnetic optical disc recording and replaying apparatus.

15 [0032]

FIG. 1 shows a schematic constitutional example of a magnetic optical disc recording and replaying apparatus 100 according to the embodiment of the present invention. As shown in FIG. 1, the magnetic optical disc recording and replaying apparatus 100 is comprised of: an
20 information recording and replaying unit 50; a system controller 51; an input unit 52; and a display unit 53. These units are connected with each other as shown in the drawing.

[0033]

The information recording and replaying unit 50 is comprised of:
25 an undescribed spindle motor to rotate a magnetic optical disc 20; an optical pickup 2 comprised of a laser diode that emits an undescribed

laser beam, various kinds of splitters that splits an emitted beam from the laser diode and a reflected beam from the magnetic optical disc in accordance with an object, a detector that converts the reflected beam from the magnetic optical disc 20 and the beam split by the various kinds of splitters to an electric signal, and an actuator that focuses the laser beam to the magnetic optical disc 20 and positions the laser beam on the information track; an RF amplifier 7 generating various kinds of signals in accordance with the object from various kinds of electric signals from the optical pickup 2; an ADIP decoder 6 detecting address signal of the magnetic optical disc 20 from a wobble signal extracting a wobble of a groove previously recorded in the magnetic optical disc 20 generated by the RF amplifier 7; an EFM encoder/recorder 9 performing EFM (Eight to Fourteen Modulation) modulation to the data of the RF (Radio Frequency) signal obtained by extracting the signal recorded in the magnetic optical disc 20 and generated in the RF amplifier 7 when replaying the information recorded in the magnetic optical disc 20, further, the EFM encoder/recorder 9 having a function to perform the EFM modulation to the data from the DRAM 12 described later when recording the information in the magnetic optical disc 20; a magnetic head 3 applying magnetic field to the magnetic film of the magnetic optical disc 20 heated to the Curie temperature or more by the laser beam when recording the information to the magnetic optical disc 20; a head drive circuit 5 determining the orientation of the magnetic field to the magnetic head 3 in accordance with the data to which the EFM modulation has been performed by the EFM encoder/decoder 9 and driving the magnetic head 3; a DRAM (Dynamic Random Access Memory) 12 storing the data to

which the EFM modulation has been performed by the EFM encoder/decoder 9 when replaying the information from the magnetic optical disc 20, further, the DRAM 12 storing the data compressed by the data compression encoder/decoder 13 described later when recording the information to the magnetic optical disc 20; a DRAM control circuit 11 controlling the data input/output to the DRAM 12; a data compression encoder/decoder 13 expanding the data from the DRAM 12 to output the expanded signal from an output unit 15 when replaying the information from the magnetic optical disc 20, further, the data compression encoder/decoder 13 compressing the signal from an input unit 14 to output to the DRAM 12 when recording the information to the magnetic optical disc 20; and a servo control circuit 8 controlling the spindle motor, an undescribed carriage motor that drives optical pickup 2 to a radius direction and the actuator of the optical pickup 2. It is to be noted that an A/D converter to convert an analog signal to a digital signal and a D/A converter that converts the digital signal to the analog signal are omitted from the drawing.

[0034]

The system controller 51 includes a CPU 51a, a ROM 51b and a RAM 51c to control each component in the information recording and replaying unit 50, and performs recording, reading and replaying of the information to the magnetic optical disc 20. Further, the CPU 51a of the system controller 51 has a function as an information attaching and generating means and all kinds of detecting means, and generates the control information called a TOC to which the processing of grouping (hereinafter, referred to as "grouping processing") when recording the

information to the magnetic optical disc 20. Furthermore, the TOC is recorded in the innermost peripheral part of the magnetic optical disc immediate before the magnetic optical disc 20 is taken out from the magnetic optical disc recording and replaying device 100. A grouping
5 processing program and the like are stored in the ROM 51b, and the RAM 51c is mainly used as a work area. The input unit 52 is the one to give the system controller 10 various kinds of operation instructions from the outside, and it gives the system controller 10 the instruction from the user. The display unit 53 is the one to display a playing state of the magnetic
10 optical disc recording and replaying device 100 and the information necessary for the user.

[0035]

In such a constitution, during the operation of the information recording of the magnetic optical disc recording and replaying device 100,
15 the input signal (a tune replayed from the CD player, the AM or FM broadcasting, for example) is input to the input unit 14 is supplied to the data compression encoder/decoder 13, the data compression encoding processing is performed, and the data of the tune is temporarily written in the DRAM by the DRAM control circuit 11 based on the instruction of the
20 system controller 10. Then the data is read out in a predetermined timing and sent to the EFM encoder/decoder 9, and is supplied to the head drive circuit 5 after the encoding processing is performed in the EFM encoder/decoder 9. And then, the head drive circuit 5 supplies a magnetic head drive signal to the magnetic head 3 in accordance with the
25 compressed data to which the encoding processing has been performed and simultaneously increases the output of the laser diode of the optical

pickup 2 to heat the magnetic film of the magnetic optical disc 20 to the Curie temperature or more, and thus the data of the tune is recorded to the magnetic optical disc 20. Further, at this point, the servo control circuit 8 performs servo control based on the instruction of the system controller 51.

[0036]

As described above, when the information is recorded to the magnetic optical disc 20, system controller 51 performs the grouping processing which is a characterizing portion. The grouping processing will be described in more detail. Firstly, the logical structure of the TOC according to the grouping processing will be described with reference to FIG. 2. The TOC according to this embodiment is comprised of the group control information including the group name information and the like other than the control information such as the disc name, the track number information attached to one track, the tune name, the number of tunes, the total playing time and the like. The group control information is the information generated to control one or a plurality of the tracks as one group. The group (group name information) and the track number information are related by the group control information. It is to be noted that in the case where the group name information is attached to the track that belongs to a group, there are two methods: one is the method where information as to each track belongs to which group is attached to each track; and the other is the method that the information as to which track belongs to the group is attached to each group. In the case of the former method, the group control information is made to be a mode called «TNO1/Group A, TNO2/Group B, TNO3/Group A, TNO4/Group C,

TNO5/Group C》, and in the case of the latter method, the it is made to be a mode called 《 Group A/TNO1&TNO2&TNO3, Group B/TNO4&TNO5》. It is to be noted that the meanings of "TNO1", "Group A" and the like will be described later. In this embodiment, the track and the tune correspond in one by one.

[0037]

FIG. 2 is a view showing the relation (logical structure) among the disc name, the group name information, the track number information and the track (tune) name, in such TOC. In FIG. 2, "Disc" shows the disc name. "Group A" shows the group controlled by the name of "A" (Groups B, C, D, ... also show the groups controlled by their names). "TNO1" shows the track number information called "1" (TNO2, 3, ... also show the track number information of their numbers). "a" shows the track called "a" (herein, a tune called "a") (b, c, d, ... also show tunes of their names).

[0038]

In the example of FIG. 2, Group A and Group B are registered with one disc. Further, the tune "a" attached with TNO1, the tune "b" attached with TNO2 and the tune "c" attached with TNO3 belong to Group A. The tune "d" attached with TNO4 and the tune "e" attached with TNO5 belong to Group B.

[0039]

Then, in the grouping processing, the grouping is performed in accordance with any kind of change regarding the track recording detected by the detection means during recording of the tune (track). There are various kinds of change contents detected by the detection means such as the instruction to end the track recording, the instruction to pause the

track recording, the instruction to change the track recording method, the change of the operation state of the device in the recording source, the change of the recording mode, the change of the source and the like, for example. Hereinafter, the detecting means will be described by being
5 separated into a recording end detecting means, a recording pause detecting device, a recording method change detecting means, an operation status change detecting means, a recording mode change detecting means, a recording source change detecting means for each of the contents of the change.

10 [0040]

Herein, in the case of attaching the track number information in the grouping processing, a rule of attaching the track number information (hereinafter, referred to as "TNO attaching rule") is regulated in which: (1) the same track number information should not be used in different
15 groups; and (2) the track numbers in each group have seriality that increases from the first number to the last number, and omitted number should be accepted.

[0041]

In the following, the grouping processing will be described
20 referring to the flowcharts of FIG. 3 to FIG. 8.

[0042]

FIG. 3 is a flowchart showing the grouping processing in the case where the grouping is performed by the recording end detecting means. Herein, a case is shown in which the tunes from the one where
25 the recording has started to the tune where the recording has ended are made to be one group.

[0043]

Firstly, the user operates the input unit 52 to set the group name information (Group A, Group B, ..., for example) that he/she wants to attach to the tune (track). Then, in the case of performing dubbing the tune output from the CD player to the magnetic optical disc 20, for example, when the user operates the input unit 52 to enter the recording instruction, the CPU 51a recognizes it (step S1), and starts the information recording control of each component of the magnetic optical disc recording and replaying device 100. And then, when the tune output from the CD player is input to the DRAM control circuit 11 via the input unit 14 and the data compression encoder/decoder, the CPU 51a recognizes it to store it in the RAM 51c by setting the TNO of the tune where the recording has started (being recorded) as the TNO of the first tune (track) of the group (step S2).

15 [0044]

Next, when the user operates the input unit 52 to enter the instruction to end the tune (track) recording (pressing a "stop recording" button, for example), the recording end detecting means of the CPU 51a detects it (step S3) and outputs the grouping instruction to the information attaching and generating means. When the information attaching and generating means of the CPU 51a stores the TNO of the tune (track) being recorded in the RAM 51c as the TNO of the last tune (track) of the group (step S4).

[0045]

25 Moreover, the information attaching and generating means attaches the same group name information (Group A, for example) to the

TNO of the first tune stored in the RAM 51c in step S2 through the TNO of the last tune stored in the RAM 51c in step S4, and thus generates the group control information. Further, the information attaching and generating means attaches the TNO to the recorded tune (track) based on the TNO attaching rule, and forms the TOC (step S5). The TOC is finally recorded in the innermost peripheral part of the magnetic optical disc 20. Thus, when performing dubbing from the CD to the magnetic optical disc 20, for example, from the recording start to the recording end are made to be one group, and thus the grouping can be performed. In addition, when dubbing of three tunes has been performed from the CD to the magnetic optical disc 20 to which no tune was recorded, TNO1, TNO2 and TNO3 are attached to each tune (track), and when dubbing of the three tunes has been performed to the magnetic optical disc 20 to which a few tunes were already recorded, the TNOs next to the largest TNO recorded in the magnetic optical disc 20 are attached to the tunes.

[0046]

FIG. 4 is a flowchart showing the grouping processing in the case where the grouping is performed by the recording pause detecting means. Herein, a case is shown in which the tunes from the one where the recording has started to the tune where the recording has paused are made to be one group.

[0047]

Firstly, the user operates the input unit 52 to set a few of the group name information that he/she wants to attach to the tune (track). It is to be noted that redundant description will be omitted because step S11 to step S14 are the same as step S1 to step S4 in the attaching

processing of FIG. 3.

[0048]

In step S15, when the user operates the input unit 52 to enter the instruction to pause the recording of the tune (track) (pressing a "pause" button, for example), the recording pause detecting device of the CPU 51a detects it to output the grouping instruction to the information attaching and generating means. When the information attaching and generating means of the CPU 51a responds to this, and stores the TNO of the tune (track) being recorded at the point when the grouping instruction has been received in the RAM 51c as the TNO of the last tune (track) of the group (step S16). Specifically, the tunes from the one where the recording has been started to the tune where the recording has been paused are made to be one group (the first group), and thus the grouping is performed.

[0049]

Next, when the user operates the input unit 52 to input the instruction to release the pause of the tune (track) recording (pressing the "pause" button, for example), the CPU 51a detects it to return to step S12. With this operation, the TNO of the first tune (track) to be recorded after releasing the pause is stored in the RAM 51c as the first tune (track) of the next group (the second group) (step S12). Hereinafter, the processing is repeated similarly to FIG. 3, the same group name information is attached to the TNO of the tune (track) that belongs to the group regarding each group, and thus the group control information is generated. Further, the information attaching and generating means attaches the TNO to the recorded tune (track) based on the TNO attaching rule, and thus forms the

TOC (step S19). As described, when performing dubbing from the CD to the magnetic optical disc 20, for example, the recording start to the pause are made to be one group, and the grouping can be performed.

[0050]

5 FIG. 5 is a flowchart showing the grouping processing in the case where the grouping is performed by the recording method change detecting means. Herein, a case is shown in which the tunes from the one where the recording has started to the tune already recorded at the point where the recording method has been changed are made to be one group.
10 This is the one that performs the grouping depending on the difference of the recording mode, for example, which is applied to the case where the recording method is changed such as an ATRAC and an ATRAC3 (double extended recording mode and four times extended recording mode).

[0051]

15 Firstly, the user operates the input unit 52 to set a few of the group name information that he/she wants to attach to the tune (track). It is to be noted that the redundant description will be omitted because step S21 to step S23 and step S29 are the same as step S1 to step S4 in the attaching processing of FIG. 3.

20 [0052]

 In step S24, when the user operates the input unit 52 to enter the instruction to pause the recording of the tune (track) (pressing the "pause" button, for example), the CPU 51a detects it. Herein, the CPU 51a does not store the TNO of the tune (track) being recorded in the RAM 51c
25 as the last tune (track) of the group, but determines whether the instruction to release the pause of the tune (track) recording is entered or

not (step S25). When the user operates the input unit 52 to enter the instruction to release the pause of the tune (track) recording, the CPU 51a detects it to determine whether the instruction to change the recording method of the tune (track) is made (step S27). For example, when the
5 user operates the input unit 52 to enter the instruction to change the recording method of the tune (track), the recording method change detecting means of the CPU 51a detects it to output the grouping instruction to the information attaching and generating means. The information attaching and generating means of the CPU 51a responds to
10 this and stores the TNO of the tune (track) already recorded at the point when the grouping instruction has been received is stored in the RAM 51c as the last tune (track) of the group (step S28). That is, the TNO of the tune (track) before the one (track) to which the recording method has been changed is stored in the RAM 51c as the last tune (track) of the group.
15 Accordingly, the tunes from the one where the recording has been started to the tune before the one to which the recording method has been changed are made to be one group (the first group), and the grouping is thus performed.

[0053]

20 Then, returning to step S22, the TNO of the first tune (track) to which the recording method has been changed is stored in the RAM 51c as the first tune (track) of the next group (the second group). Then, when there is no change in the recording method of the track, the group is formed in accordance with the instruction to end the track recording
25 similarly to the foregoing processing of FIG. 3. Hereinafter, the processing similar to FIG. 3 or FIG. 4 is repeated, the same group name information

is attached to the TNO of the tune (track) that belongs to the group regarding each group, and the group control information is generated. Further, the information attaching and generating means attaches the TNO to the recorded tune (track) based on the TNO attaching rule, and
5 forms the TOC (step S30). As described, when performing dubbing from the CD to the magnetic optical disc 20, the tunes from the one where the recording has been started to the tune already recorded at the point when the recording method has been changed are made to be one group, and the grouping can be performed.

10 [0054]

FIG. 6 is a flowchart showing the grouping processing in the case where the grouping is performed by the operation status change detecting means. Herein, a case is shown in which the tunes from the one where the recording has been started to the tune already recorded at the
15 point when the instruction of changing the CD has been made in the device, the CD player for example, in the recording source are made to be one group.

[0055]

Firstly, the user operates the input unit 52 to set a few of the
20 group name information that he/she wants to attach to the tune (track). It is to be noted that redundant description will be omitted because step S41 to step S43 and step S50 are the same as step S1 to step S4 in the attaching processing of FIG. 3.

[0056]

25 In step S44, the operation status change detecting means of the CPU 51a determines whether there is a change in the operation state of

the CD player as a sound source based on the signal input by the CD player, for example, whether replaying of the CD has been stopped. If the operation status change detecting means of the CPU 51a detects that the replaying of the CD has been stopped, for example, the CPU 51a pauses the recording function (step S45). Then, when a recording end instruction is not made by the user (step S46), the CPU 51a determines whether there is a pause release instruction (step S47). When the pause is released to resume the recording, the operation status change detecting means determines whether the CD has been changed (step S48). When the operation status change detecting means of the CPU 51a detects that the CD has been changed, it outputs the grouping instruction to the information attaching and generating means. The information attaching and generating means of the CPU 51a responds to this, and stores the TNO of the tune (track) already recorded at the point when the grouping instruction has been received in the RAM 51c as the last tune (track) of the group (step S49). That is, the tunes from the one where the recording has been started to the tune already recorded at the point when the instruction of changing the CD has been made are made to be one group (the first group), and thus the grouping is performed.

[0057]

Then, returning to step S42, the TNO of the first tune (track) after the one to which the change of the operation state has been performed in the device of the recording source is stored in the RAM 51c as the first tune (track) of the next group (the second group). Then, when there is no further change to the operation state of the CD player, the group is formed in accordance with the instruction to end the track

recording similarly to the foregoing processing of FIG. 3. Hereinafter, the processing is repeated similar to FIG. 3 and FIG. 4, and the same group name information is attached to the TNO of the tune (track) that belongs to the group for each group, and thus the group control information is generated. Further, the information attaching and generating means attaches TNO to the recorded tune (track) based on the TNO attaching rule, and forms the TOC (step S51). As described, when performing dubbing from the CD to the magnetic optical disc 20, for example, the tunes from the one where the recording has been started to the tune already recorded at the point when the operation state of the CD player has been changed are made to be one group, and the grouping can be performed. It is to be noted that the example of FIG. 6 was described by exemplifying the case of detecting the changing of the CD, but the processing of step S49 may be performed by detecting the changing of the CD by a disc changer of the device in the recording source. Although the example of FIG. 6 showed the device in the recording source as the CD player, it may be another device such as a cassette tape player, an MD player and a tuner. In the case of the tuner, the processing of step S49 may be performed by detecting the change of a receiving station.

[0058]

FIG. 7 is a flowchart showing the grouping processing in the case where the grouping is performed by the recording mode change detecting means. Herein, a case is shown in which the tunes from the one where the recording has been started to the tune already recorded at the point when the recording mode has been changed are made to be one group. In this case, the recording mode shows a special recording mode

such as a mode to record only the first tune of the CD, or a mode to record only track that has been set.

[0059]

Firstly, the user operates the input unit 52 to set a few of the group name information that he/she wants to attach to the tune (track). It is to be noted that redundant description will be omitted because step S61 to step S63 and step S69 are the same as step S1 to step S4 in the attaching processing of FIG. 3.

[0060]

In step S64, when the user operates the input unit 52 to enter the instruction to pause the tune (track) recording, the CPU 51a detects it. Next, the CPU 51a determines whether the instruction to release the pause of the tune (track) recording has been entered (step S65). When the user operates the input unit 52 to enter the instruction to release the pause of the tune (track) recording, the CPU 51a detects it to determine whether the recording mode of the tune (track) has been changed (step S67). When it is determined that the recording mode has been changed, the recording mode change detecting means of the CPU 51a detects it to output the grouping instruction to the information attaching and generating means. The information attaching and generating means of the CPU 51a responds to this, and stores the TNO of the tune (track) already recorded at the point of receiving the grouping instruction in the RAM 51c as the last tune (track) of the group (step S28). That is, the TNO of the tune (track) before the tune (track) to which the recording mode has been changed is stored in the RAM 51c as the last tune (track) of the group. Accordingly, the tunes from the one where the recording has been

started to the tune before the one to which the recording mode has been changed are made to be one group (the first group), and thus the grouping is performed.

[0061]

5 And then, returning to step S62, the TNO of the first tune (track) to which the recording mode has been changed is stored in the RAM 51c as the first tune (track) of the next group (the second group). Then, when there is no further change to the track recording mode, the group is formed in accordance with the instruction to end the track recording
10 similarly to the foregoing processing of FIG. 3. Hereinafter, the processing is repeated similar to FIG. 3 or FIG. 4, and the same group name information is attached to the TNO of the tune (track) that belongs to the group for each group, and thus the group control information is generated. Further, the information attaching and generating means attaches TNO to
15 the recorded tune (track) based on the TNO attaching rule, and forms the TOC (step S70). As described, when performing dubbing from the CD to the magnetic optical disc 20, for example, the tunes from the one where the recording has been started to the tune already recorded at the point when the recording mode has been changed are made to be one group.

20 [0062]

 FIG. 8 is a flowchart showing the grouping processing in the case where the grouping is performed by the recording source detecting means. Herein, a case is shown in which the tunes from the one where the recording has been started to the tune already recorded at the point
25 when the recording source has been change, for example, from the CD to the tuner, are made to be one group.

[0063]

Firstly, the user operates the input unit 52 to set a few of the group name information that he/she wants to attach to the tune (track). It is to be noted that redundant description will be omitted because step S71 to step S73 and step S78 are the same as step S1 to step S4 in the attaching processing of FIG. 3.

[0064]

In step S74, when the recording source is changed, for example, from the CD player to another CD player, from the CD to the AM or FM broadcasting, the recording source change detecting means of the CPU 51a detects it to output the grouping instruction to the information attaching and generating means. The information attaching and generating means of the CPU 51a responds to this, updates the TNO (step S75 and S76). This is because the TNOs attached to the tunes (tracks) before and after the recording source is changed should be discriminated. Then, The information attaching and generating means of the CPU51a stores the TNO of the tune (track) already recorded at the point of receiving the instruction to change the recording source in the RAM 51c as the last tune (track) of the group (step S77). That is, the TNO of the tune before the one to which the recording source has been changed is stored in the RAM 51c as the last tune (track) of the group. Accordingly, the tunes from the one where the recording has been started to the tune before the one to which the recording source has been changed are made to be one group (the first group), thus the grouping is performed.

[0065]

Then, returning to step S72, the TNO of the first tune (track) to

which the recording source has been changed is stored in the RAM 51c as the first tune (track) of the next group (the second group). When there is no further change to the recording source of the track, the group is formed in accordance with the instruction to end the track recording similarly to the foregoing processing of FIG. 3. Hereinafter, the processing is repeated similarly to FIG. 3 and FIG. 4, and the same group name information is attached to the TNO of the tune (track) that belongs to the group for each group, and the group control information is generated. Further, the information attaching and generating means attaches the TNO to the recorded tune (track) based on the TNO attaching rule, and forms the TOC (step S79). As described, the tunes from the one where the recording has been started to the tune already recorded at the point when the recording source has been changed can be made as one group. It is to be noted that this can be applicable not only to the change (switching) of individual source such as the CD and the tuner, but also to the switching of recording input (Digital, Opt/Digital, Coaxial/Analog). The processing of step S77 may be performed by detecting the change of a category code in the digital input. Furthermore, in the case of input from the tuner, the processing of step S77 may be performed by detecting the change of data content of multiplex FM broadcasting or the like.

[0066]

In the processing of FIG. 3 to FIG. 8, if the recording is not performed by dubbing from the CD but by air check, one TNO is attached to a period from the recording start to the recording end, and the group name information is attached to the tunes (tracks) in the period.

[0067]

Also in the processing of FIG. 3 to FIG. 8, description was made for the case of the grouping is performed by the recording end detecting means, the recording pause detecting means, the recording method change detecting means, the operation status change detecting means, the recording mode change detecting means, and the recording source change detecting means. However, the grouping is not limited to these and other detection means may be constituted in which the change of genre of the tune (track) or the name of a singer is detected to perform the grouping.

[0068]

10 In addition, in the processing of FIG. 3 to FIG. 8, the group name information set by the user may be set not only before the recording start of the tune (track) but also during the recording. Further, in the case of setting no group name information, a name (A, B, C or the like) previously set in the ROM 51b or the like is attached, and the user can
15 change it to a name that he/she desires after the recording.

[0069]

Furthermore, in the foregoing FIG. 3 to FIG. 8, description was made for the grouping by each detection means in each processing, but the grouping processing of FIG. 3 to FIG. 8 are integrated in an actual
20 processing operation.

[0070]

As described, according to this embodiment, since the grouping is automatically performed in accordance with any kind of change (recording stop or recording pause, for example) regarding the track
25 recording when recording the tune (track), the user may only enter the group name information (group name), the user can omit the operation

that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

[0071]

It is to be noted that in the embodiment, description was made for the case where the information recording device of the present invention is applied to the magnetic optical disc recording and replaying device. However, the present invention can be also applied to the recording and replaying device for an information recording medium such as the MD, the CD, the DVD and the LD, an integrated audio device in which a plurality of the information storage media can be used, an audio device installed in a car and the like.

[0072]

[EFFECT OF THE INVENTION]

As explained above, according to the invention described in claim 1, since the invention is provide with the feature that the grouping is performed by the recording method change, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

[0073]

According to the invention described in claim 2, in the invention described in claim 1, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

[0074]

According to the invention described in claim 3, since the invention is provided with the feature that the grouping is performed by

the operation state change of the device in the recording source detected by the operation status change detecting means, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

5 [0075]

According to the invention described in claim 4, in the invention described in claim 3, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

10 [0076]

According to the invention described in claim 5, since the invention is provided with the feature that the grouping is performed by the recording mode change of the device in the recording source, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

[0077]

According to the invention described in claim 6, in the invention described in claim 5, the track recorded after said grouping instruction is received be a group different from said track already recorded.

20 [0078]

According to the invention described in claim 7, since the invention is provided with the feature that continuous track number information is attached to the track, the group control can be efficiently performed with the group control information.

25 [0079]

According to the invention described in claim 8, since the

invention is provided with the feature that grouping is performed by the recording source change detected by the recording source detecting means, the user can omit the operation that he/she performs the grouping by himself/herself, and thus the operation load of the user can be reduced.

5 [0080]

According to the invention described in claim 9, in the invention described in claim 8, the track recorded after receiving the grouping instruction can be made to be the group different from the track already recorded.

10 [0081]

According to the invention described in claim 10, since the invention is provided with the feature that continuous track number information is attached to the track, the group control can be efficiently performed with the group control information.

15 [0082]

According to the invention described in claim 11, since the invention is provided with the feature that the track number information attached to the track is discriminated before and after receiving the grouping instruction, the user can easily grasp individual group from the track number information as well.

20

[BRIEF DESCRIPTION OF THE DRAWINGS]

[FIG. 1]

FIG. 1 is a view showing a schematic constitutional example of a magnetic optical disc recording and replaying device according to the present invention.

25

[FIG. 2]

FIG. 2 is a view showing a relation (logical structure) among the group name information, the track number information and the track (tune).

[FIG. 3]

5 FIG. 3 is a flowchart showing a grouping processing in the case where the grouping is performed by the recording end detecting means.

[FIG. 4]

FIG. 4 is a flowchart showing a grouping processing in the case where the grouping is performed by the recording pause detecting means.

10 [FIG. 5]

FIG. 5 is a flowchart showing a grouping processing in the case where the grouping is performed by the recording method change detecting means.

[FIG. 6]

15 FIG. 6 is a flowchart showing a grouping processing in the case where the grouping is performed by the operation status change detecting means.

[FIG. 7]

20 FIG. 7 is a flowchart showing a grouping processing in the case where the grouping is performed by the recording mode change detecting means.

[FIG. 8]

FIG. 8 is a flowchart showing a grouping processing in the case where the grouping is performed by the recording source detecting means.

25 [EXPLANATION OF REFERENCE CHARACTERS]

2 optical pickup

- 3 magnetic head
- 5 head drive circuit
- 6 ADIP decoder
- 7 RF amplifier
- 5 8 servo control circuit
- 9 EFM encoder/decoder
- 11 DRAM control circuit
- 12 DRAM
- 13 data compression encoder/decoder
- 10 20 magnetic optical disc
- 50 information recording and replaying unit
- 51 system controller
- 51a CPU
- 51b ROM
- 15 51c RAM
- 52 input unit
- 53 display unit
- 100 magnetic optical disc recording and replaying device

[DOCUMENT TITLE] ABSTRACT

[ABSTRACT]

[OBJECT] The object of the present invention is to provide an
information recording apparatus that can efficiently group tunes and can
5 reduce the operation load of the user.

[MEANS OF SOLUTION] When recording method change detecting
means detects an instruction to change the method of the track recording
to the information recording medium after the track recording has started,
the grouping instruction is given to the information attaching and
10 generation means. Then, the information attaching and generation means
generates the group control information by making the tracks from the
one where the recording to the information recording medium is started to
the one already recorded at the point when the grouping instruction is
received be the same group, for example, the information of the same
15 group name is attached. Therefore, since the grouping is automatically
performed by the recording method change, the user can omit the
operation that he/she performs the grouping by himself/herself, and thus
the operation load of the user can be reduced.

[SELECTED DRAWING] FIG.5



FIG. 1

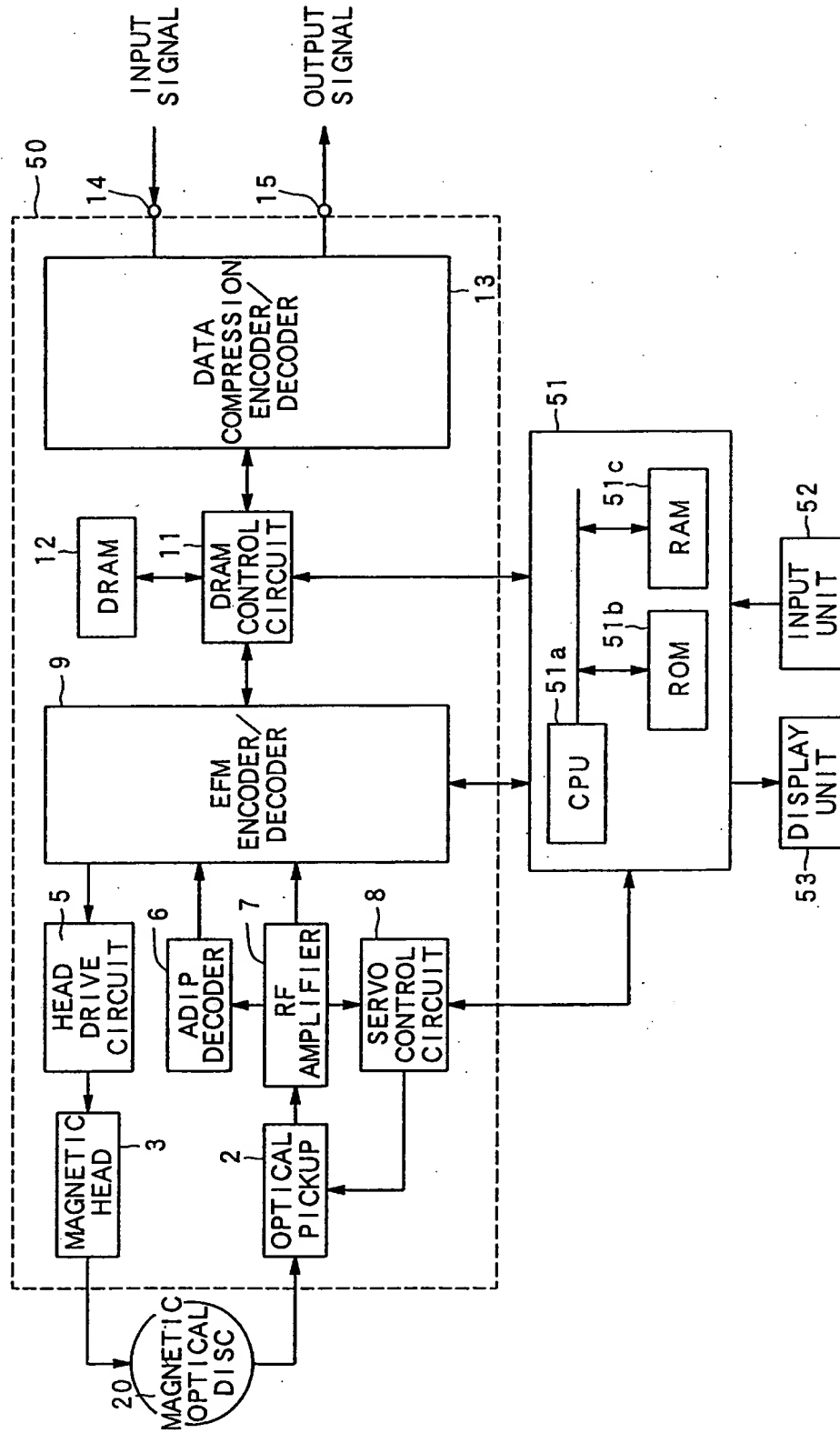




FIG. 2

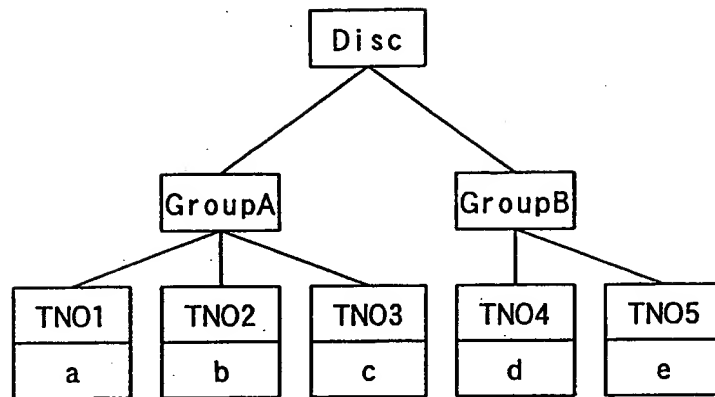




FIG. 3

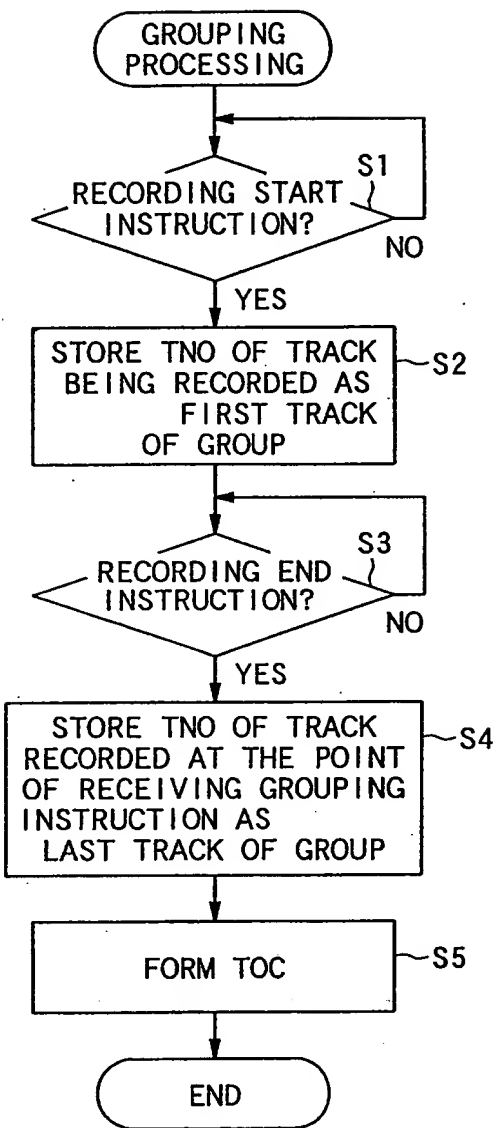




FIG. 4

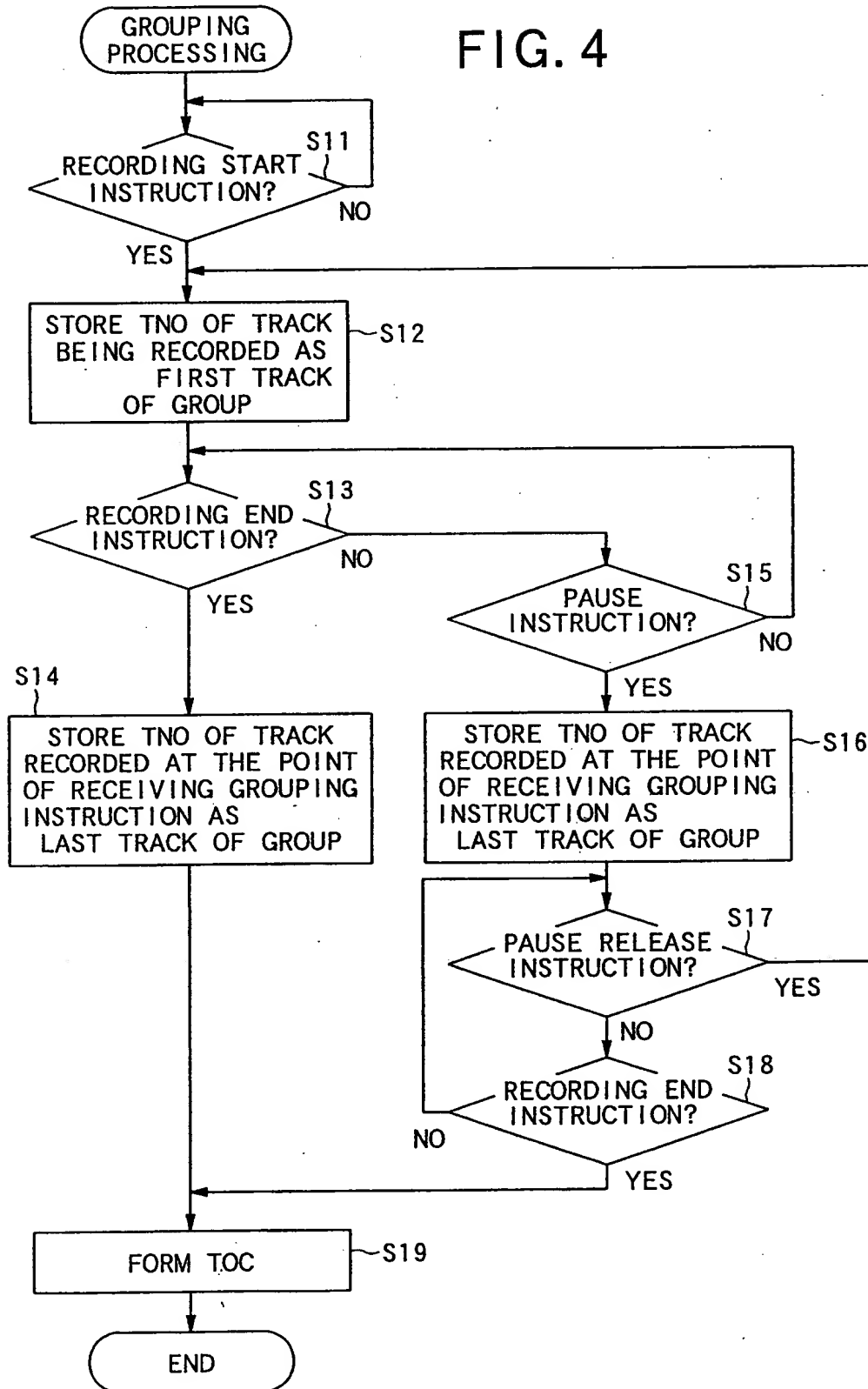




FIG. 5

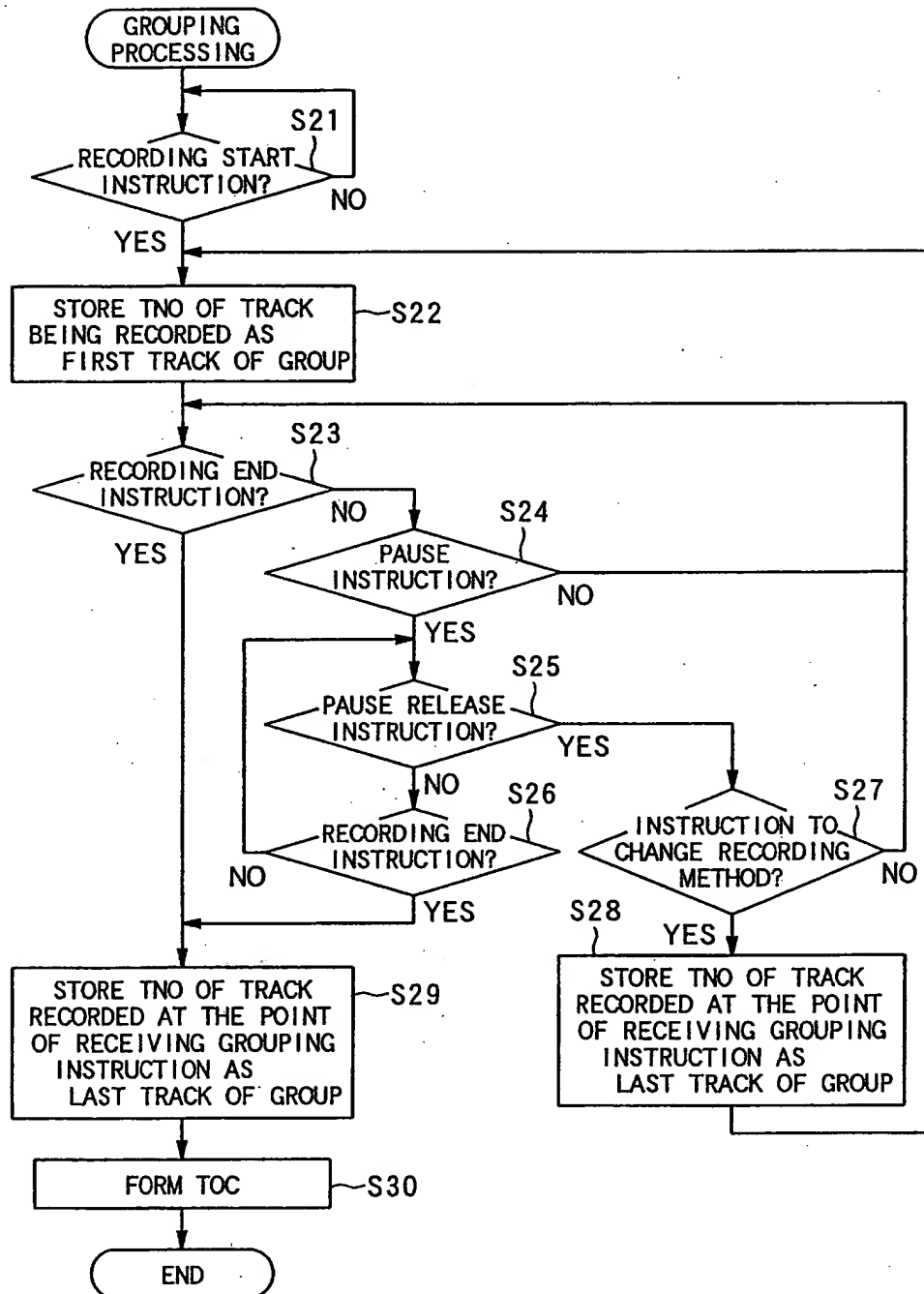




FIG. 6

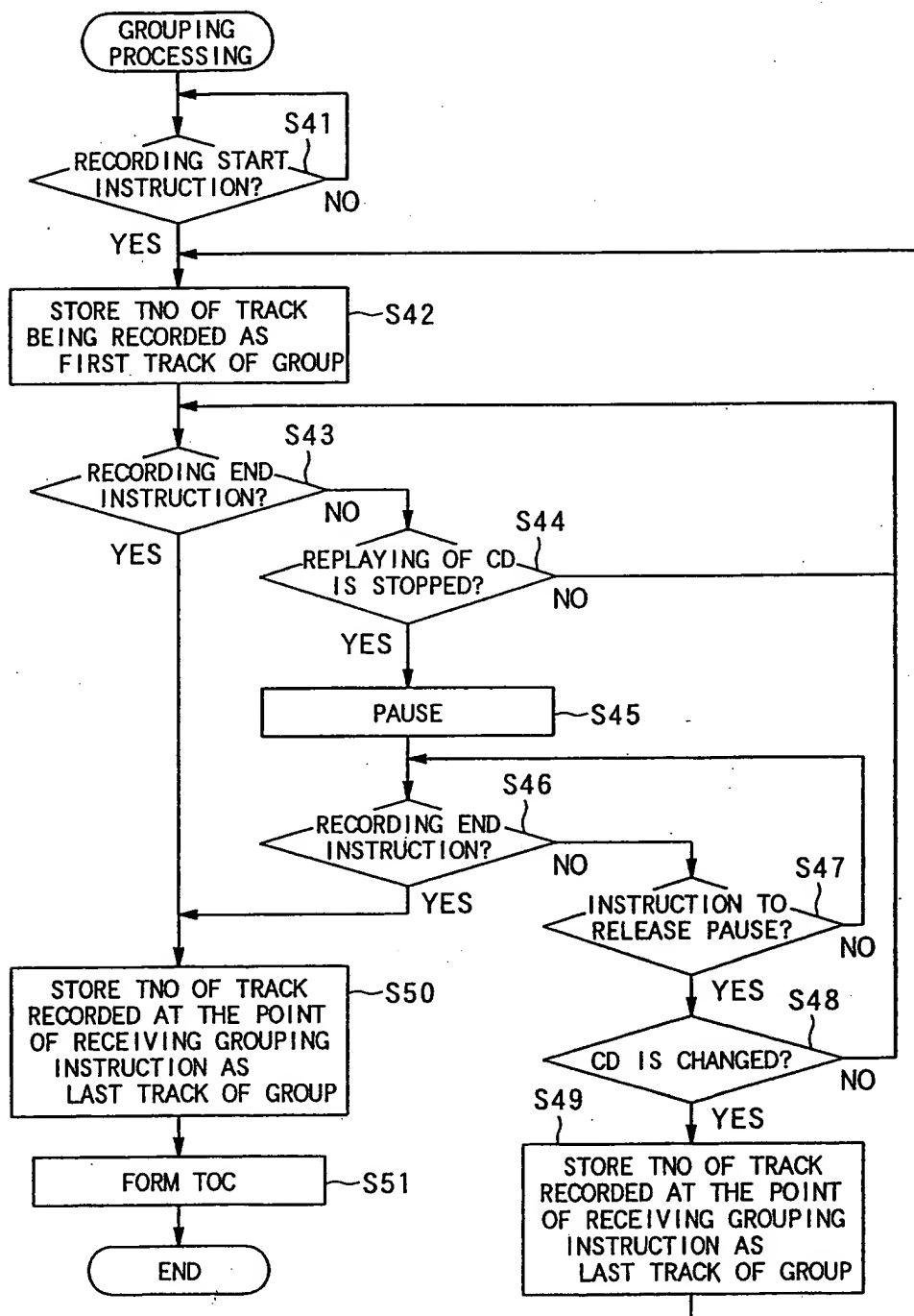




FIG. 7

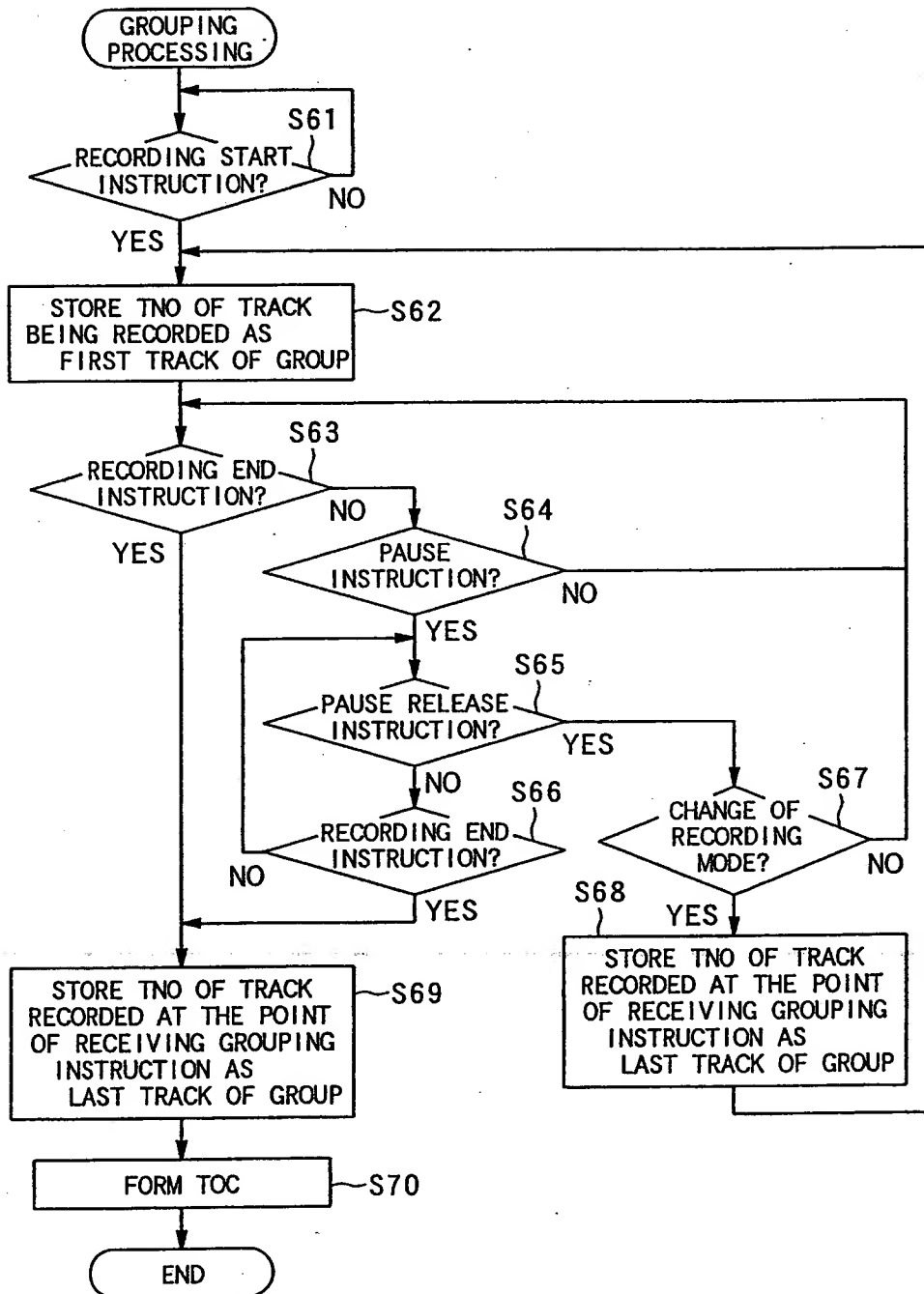




FIG. 8

